Vincotech

V23990-P865-F49-PM
V23990-P865-F48-PM

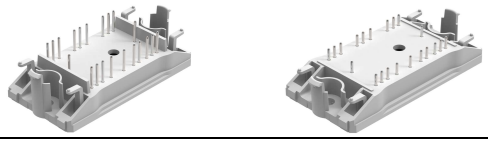
datasheet

flow PACK 0 — **600 V / 50 A**

Features

- 2 clip housing in 12 mm and 17 mm height
- Trench Fieldstop IGBT^3 technology
- Compact and low inductance design
- Built-in NTC

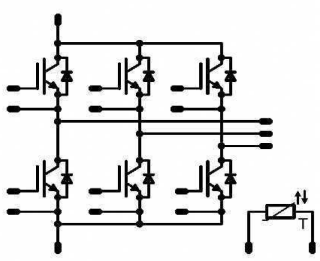
flow 0 housing



Target Applications

- Motor Drives
- Power Generation
- UPS

Schematic



Types

- V23990-P865-F49-PM
- V23990-P865-F48-PM

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Inverter Transistor				
Collector-emitter voltage	V_{CE}		600	V
DC collector current	I_C	$T_j = T_{jmax}$ T_s = 80 °C	45	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	150	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	76	W
Gate-emitter peak voltage	V_{GE}		±20	V
Short circuit ratings*	t_{SC} V_{CC}	$T_j \leq$ 150 °C V_{GE} = 15 V	6 360	µs V
Maximum Junction Temperature	T_{jmax}		175	°C
* It is recommended to not exceed 1000 short circuit situations in the lifetime of the module and to allow at least 1s between short circuits				
Inverter Diode				
Peak Repetitive Reverse Voltage	V_{RRM}		600	V
DC forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	41	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	100	A
Power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	57	W
Maximum Junction Temperature	T_{jmax}		175	°C
Thermal properties				
Storage temperature	T_{stg}		-40…..+125	°C
Operation junction temperature	T_{op}		-40…..+T_{jmax}-25	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Insulation properties					
Insulation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
		AC Voltage	t_p = 1 min	2500	V
Creepage distance				min.12,7	mm
Clearance		12mm height		9,22	mm
		17mm height		min.12,7	mm
Comparative Tracking Index	CTI			>200	

*100% tested in production

Characteristic Values

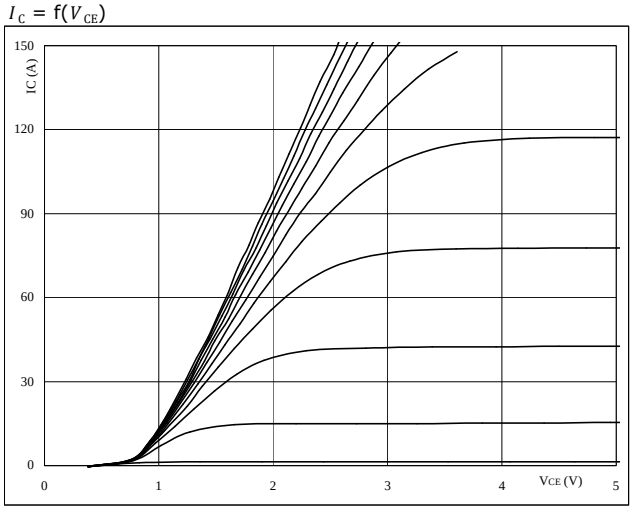
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_r [V] V_{CE} [V] V_{DS} [V]	I_C [A] I_F [A] I_D [A]	T_j [°C]	Min	Typ	Max	
Inverter Transistor										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0008	25	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		50	25 150		1,51 1,75	2,1	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	600		25			350	µA
Gate-emitter leakage current	I_{GES}		20	0		25			650	nA
Integrated Gate resistor	R_{gint}							none		Ω
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	300	50	25 150		95 100		ns
Rise time	t_r					25 150		14 18		
Turn-off delay time	$t_{d(off)}$					25 150		161 184		
Fall time	t_f					25 150		109 131		
Turn-on energy loss	E_{on}					25 150		0,68 1,02		mWs
Turn-off energy loss	E_{off}					25 150		1,30 1,76		
Input capacitance	C_{ies}	f = 1 MHz	0	25		25		3140		pF
Output capacitance	C_{oss}							200		
Reverse transfer capacitance	C_{rss}							93		
Gate charge	Q_G		15	300	50	25		310		nC
Thermal resistance chip to heatsink	$R_{th(j-s)}$	λ_{paste} = 0,8 W/mK (P12)						1,25		K/W
Inverter Diode										
Diode forward voltage	V_F				50	25 150		1,6 1,55	2,2	V
Peak reverse recovery current	I_{RRM}	R_{gon} = 8 Ω	±15	300	50	25 150		51,6 62,4		A
Reverse recovery time	t_{rr}					25 150		130 172		ns
Reverse recovered charge	Q_{rr}					25 150		2,29 4,37		µC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 150		3909 2375		A/ms
Reverse recovered energy	E_{rec}					150		0,92		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	λ_{paste} = 0,8 W/mK (P12)						1,67		K/W
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1486 Ω				100	-5		+5	%
Power dissipation	P					25		210		mW
Power dissipation constant						25		4,4		mW/K
B-value	$B_{(25/50)}$	Tol. -13,1%				25		3940		K
B-value	$B_{(25/100)}$	Tol. +11,6%				25		4000		K
Vincotech NTC Reference									A	

Output Inverter

figure 1 IGBT

Typical output characteristics

$I_C = f(V_{CE})$

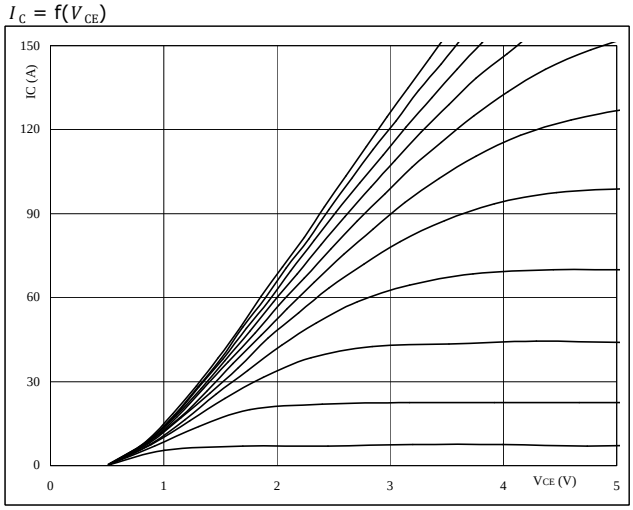


t_p = 250 µs
T_j = 25 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 2 IGBT

Typical output characteristics

$I_C = f(V_{CE})$

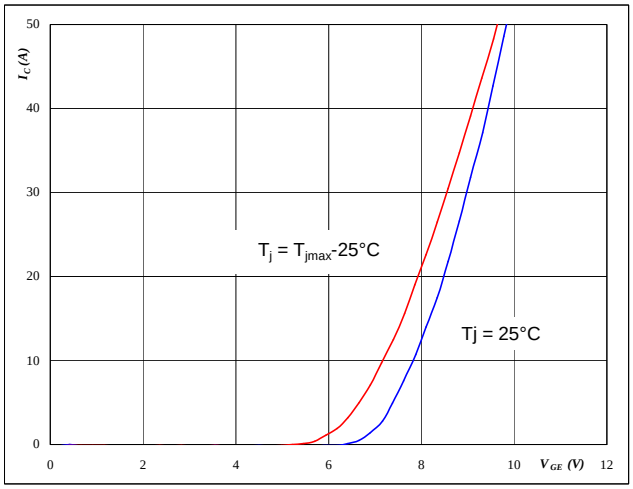


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3 IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

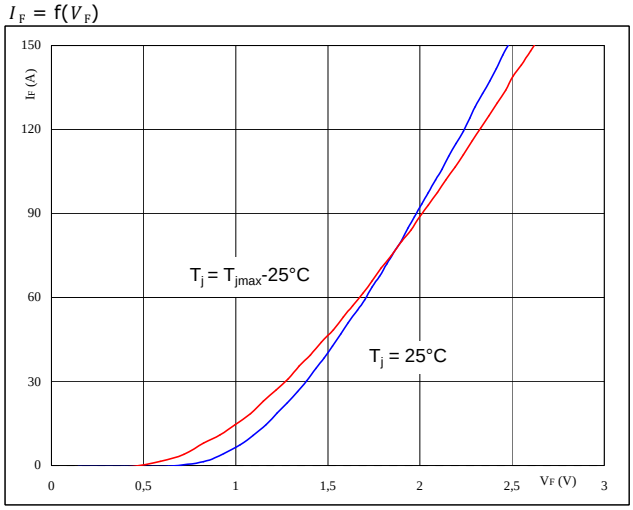


t_p = 250 µs
V_{CE} = 10 V

figure 4 FWD

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



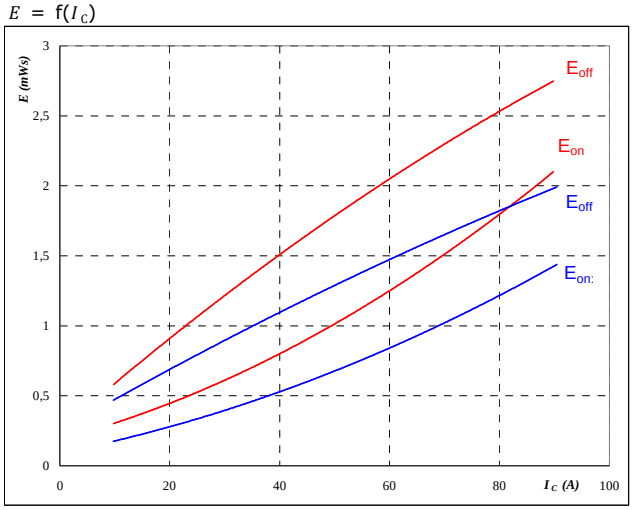
t_p = 250 µs

Output Inverter

figure 5 IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



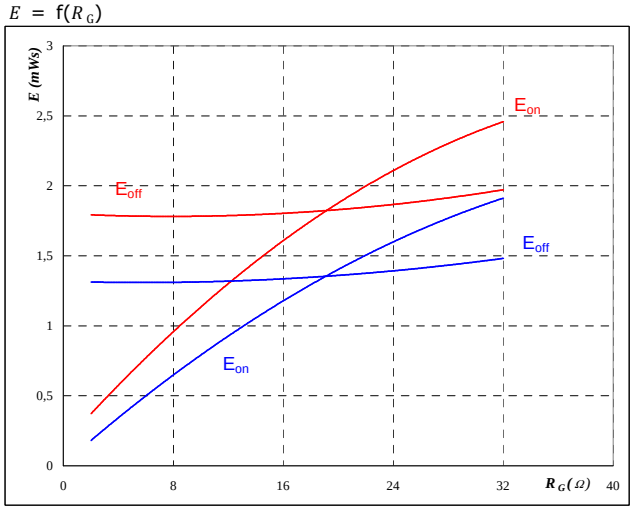
inductive load

T_j =	25/150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 6 IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



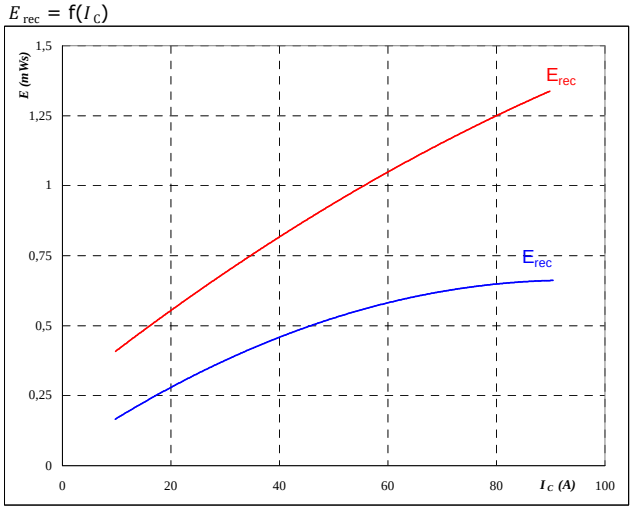
inductive load

T_j =	25/150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
I_C =	50	A

figure 7 IGBT

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



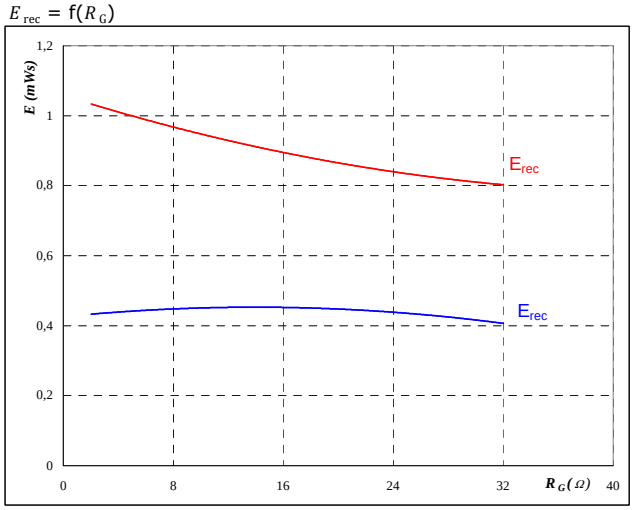
inductive load

T_j =	25/150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

figure 8 IGBT

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



inductive load

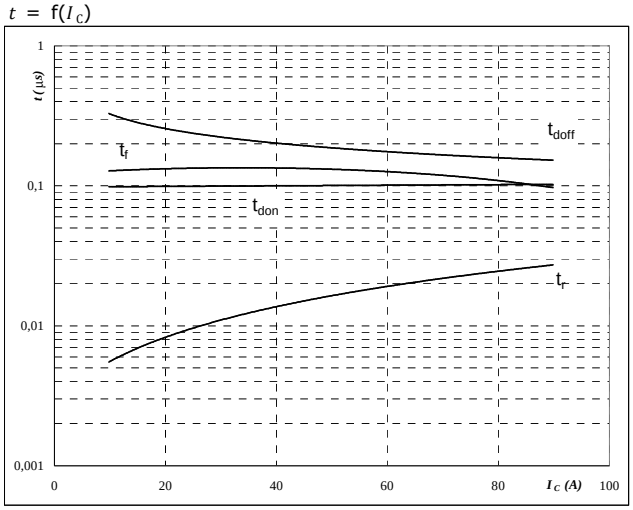
T_j =	25/150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
I_C =	50	A

Output Inverter

figure 9 IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



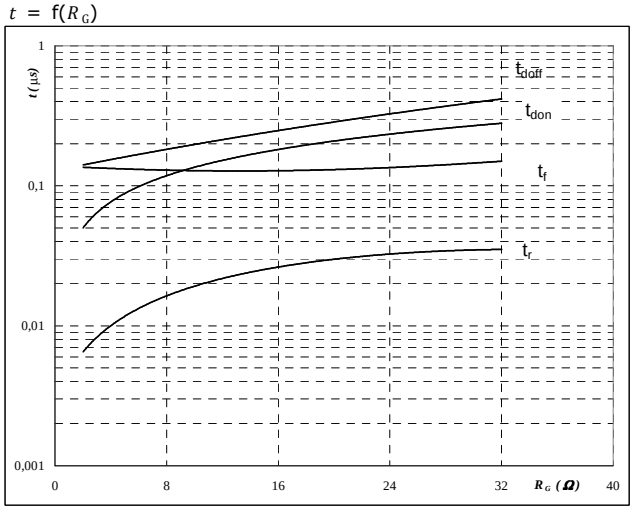
inductive load

T_j =	150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 10 IGBT

Typical switching times as a function of gate resistor

$t = f(R_G)$



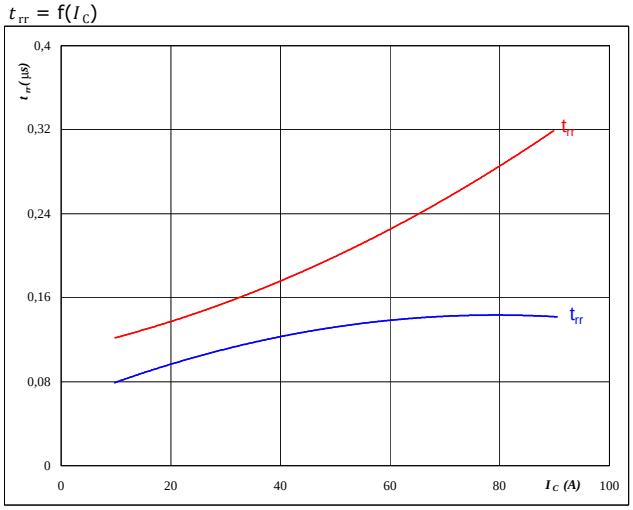
inductive load

T_j =	150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
I_C =	50	A

figure 11 FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

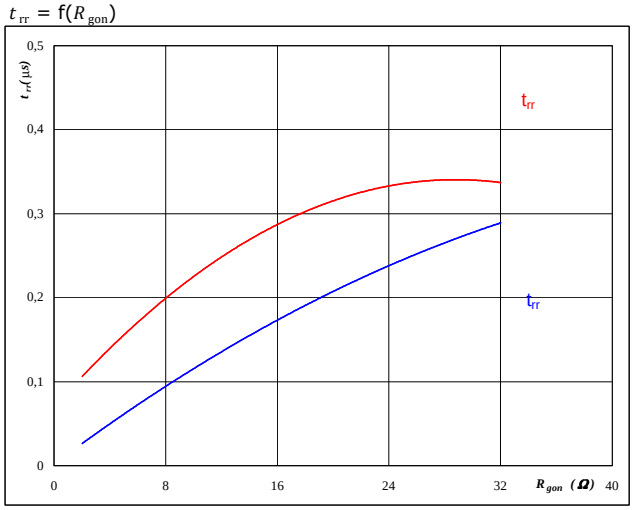


T_j =	25/150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

figure 12 FWD

Typical reverse recovery time as a function of IGBT turn on gate resistor

$t_{rr} = f(R_{gon})$



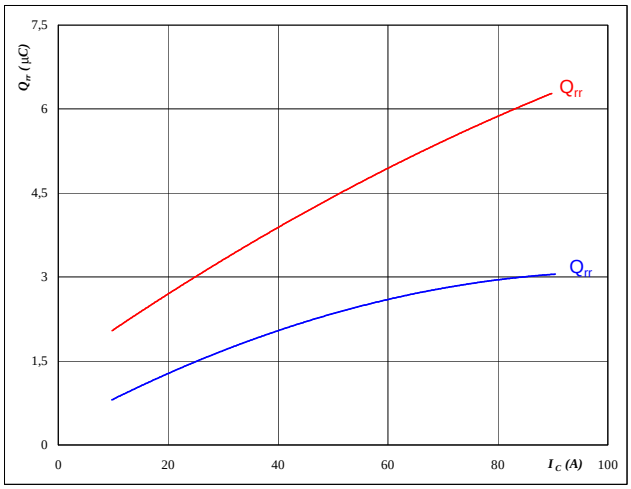
T_j =	25/150	°C
V_R =	300	V
I_F =	50	A
V_{GE} =	±15	V

Output Inverter

figure 13 FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$

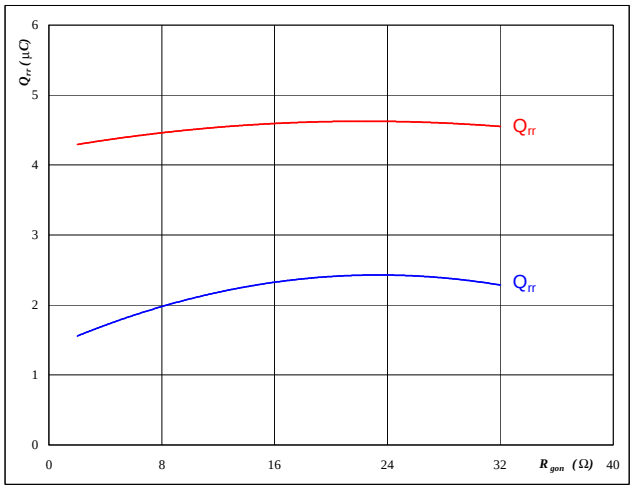


T_j =	25/150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

figure 14 FWD

Typical reverse recovery charge as a function of IGBT turn on gate resistor

$Q_{rr} = f(R_{gon})$

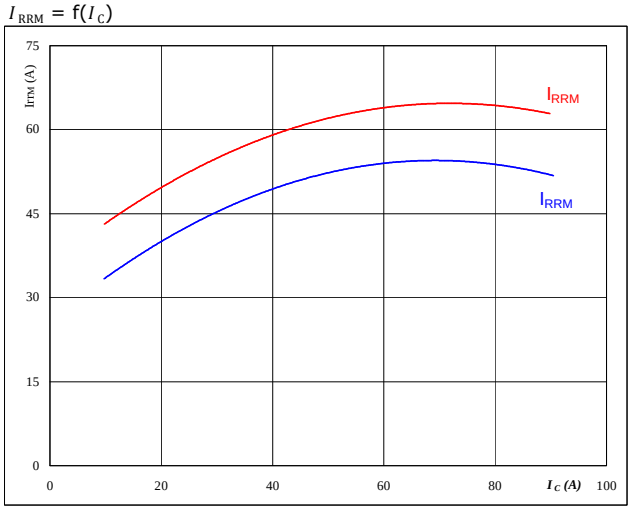


T_j =	25/150	°C
V_R =	300	V
I_F =	50	A
V_{GE} =	±15	V

figure 15 FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$

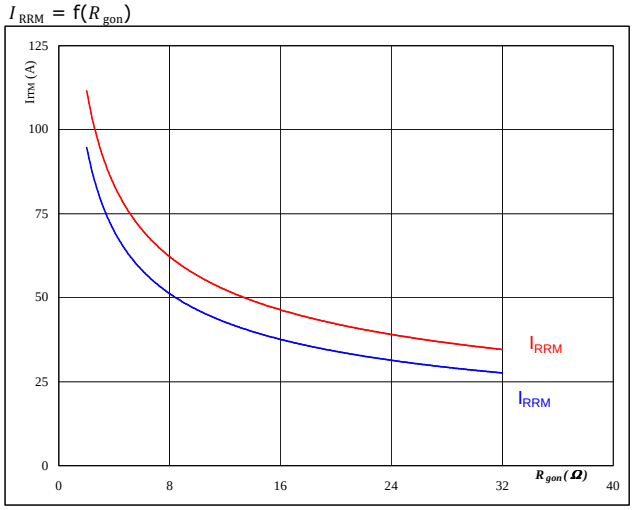


T_j =	25/150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

figure 16 FWD

Typical reverse recovery current as a function of IGBT turn on gate resistor

$I_{RRM} = f(R_{gon})$



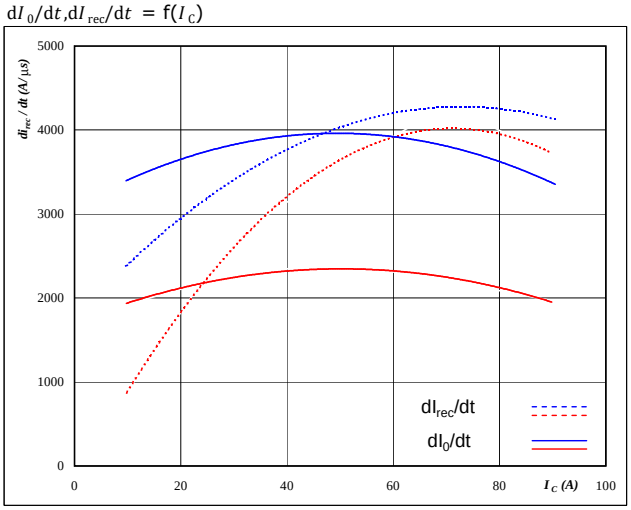
T_j =	25/150	°C
V_R =	300	V
I_F =	50	A
V_{GE} =	±15	V

Output Inverter

figure 17 FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current

$dI_0/dt, dI_{rec}/dt = f(I_C)$

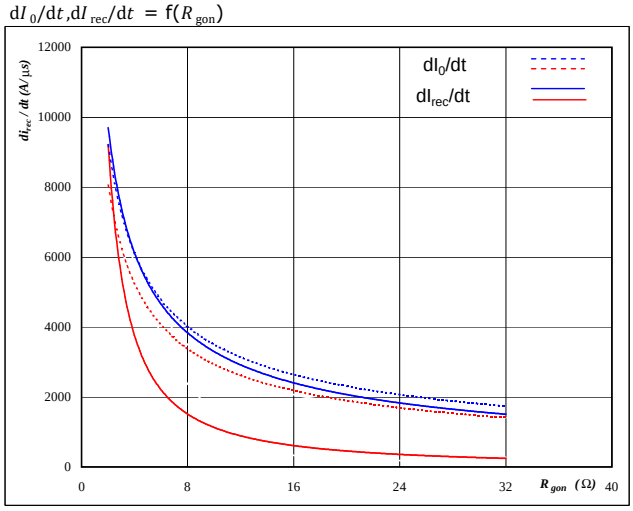


T_j =	25/150	°C
V_{CE} =	300	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

figure 18 FWD

Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$

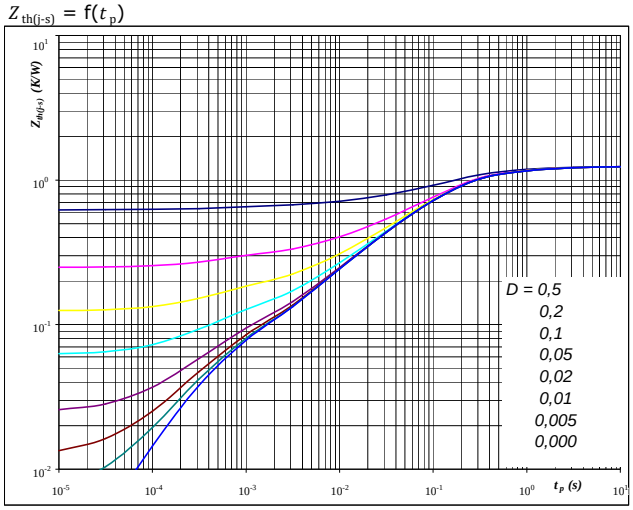


T_j =	25/150	°C
V_R =	300	V
I_F =	50	A
V_{GE} =	±15	V

figure 19 IGBT

IGBT transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



D =	t_p / T	
$R_{th(j-s)}$ =	1,25	K/W

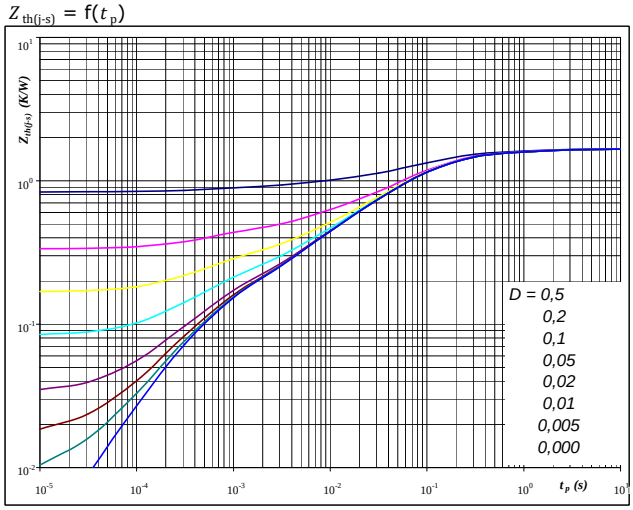
IGBT thermal model values

R (K/W)	Tau (s)
2,46E-02	9,85E+00
1,58E-01	1,06E+00
6,51E-01	1,57E-01
2,59E-01	3,32E-02
9,42E-02	6,06E-03
5,79E-02	4,45E-04

figure 20 FWD

FWD transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



D =	t_p / T	
$R_{th(j-s)}$ =	1,67	K/W

FWD thermal model values

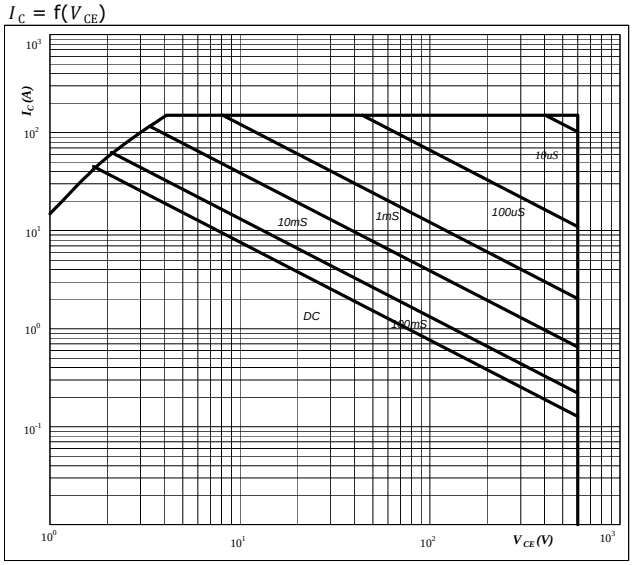
R (K/W)	Tau (s)
2,55E-02	9,77E+00
1,59E-01	9,92E-01
6,81E-01	1,32E-01
5,00E-01	3,66E-02
1,83E-01	5,78E-03
1,22E-01	5,07E-04

Output Inverter

figure 21 IGBT

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$

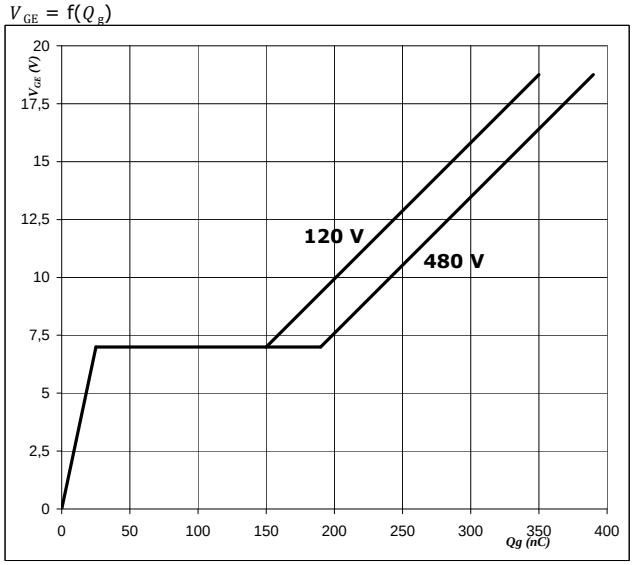


D = single pulse
T_s = 80 °C
V_{GE} = ±15 V
T_j = T_{jmax}

figure 22 IGBT

Gate voltage vs Gate charge

$V_{GE} = f(Q_g)$



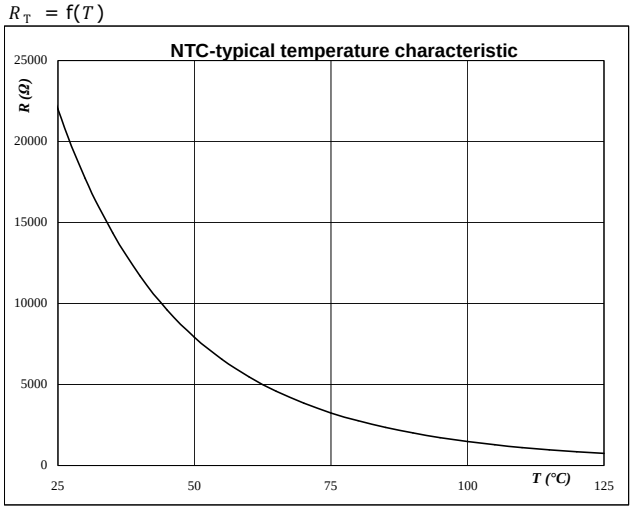
I_C = 50 A

Thermistor

figure 1 Thermistor

Typical NTC characteristic as a function of temperature

$R_T = f(T)$



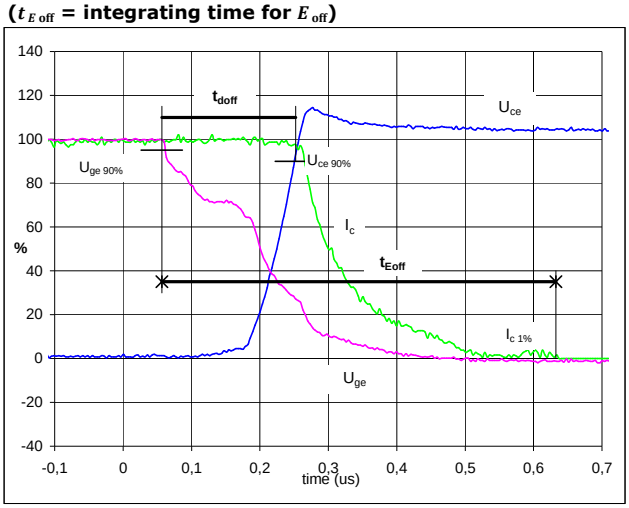
Switching Definitions Output Inverter

General conditions

T_j	=	150 °C
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

Figure 1 IGBT

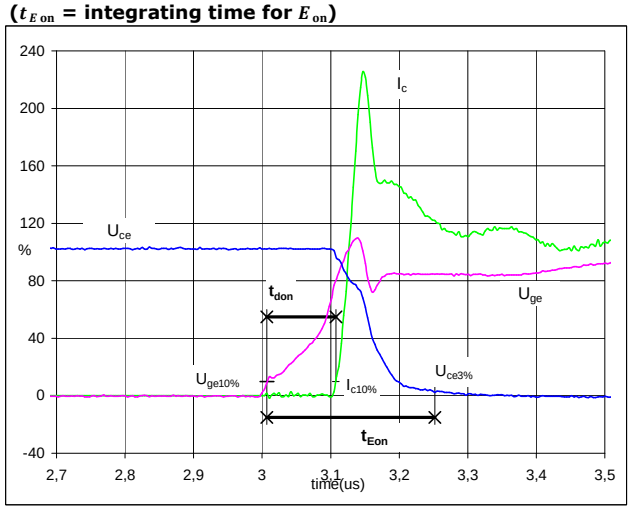
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	300	V
I_C (100%) =	50	A
t_{doff} =	0,18	µs
$t_{E\,off}$ =	0,58	µs

Figure 2 IGBT

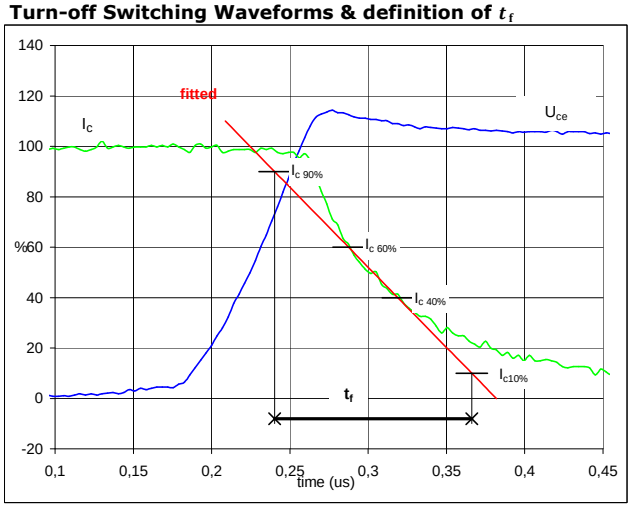
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	300	V
I_C (100%) =	50	A
t_{don} =	0,10	µs
$t_{E\,on}$ =	0,24	µs

Figure 3 IGBT

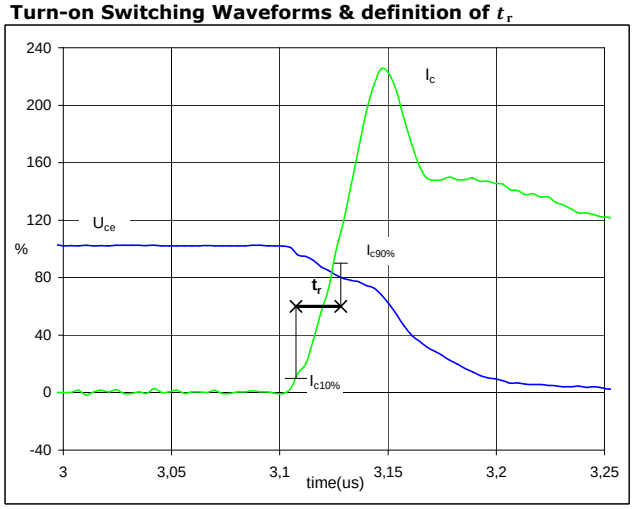
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	300	V
I_C (100%) =	50	A
t_f =	0,13	µs

Figure 4 IGBT

Turn-on Switching Waveforms & definition of t_r

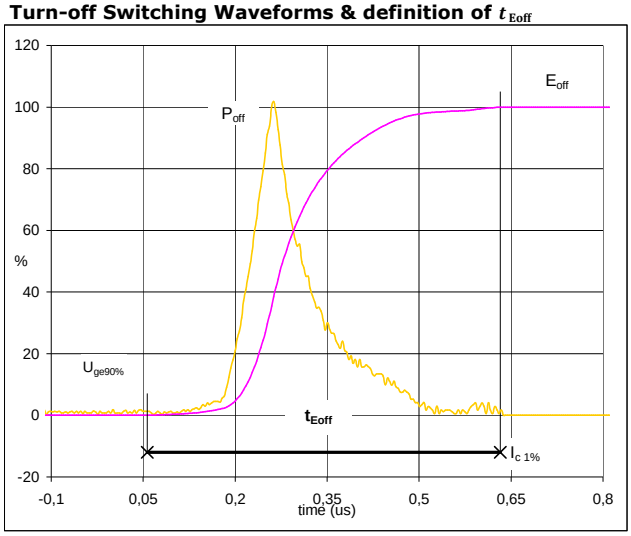


V_C (100%) =	300	V
I_C (100%) =	50	A
t_r =	0,02	µs

Switching Definitions Output Inverter

Figure 5 IGBT

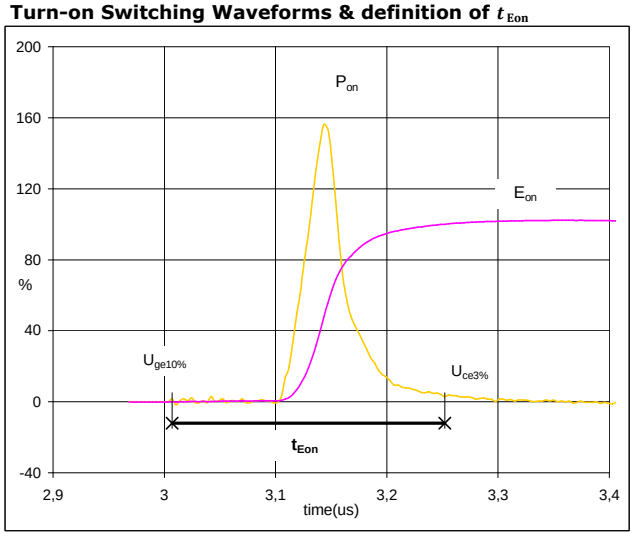
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	15,02	kW
E_{off} (100%) =	1,76	mJ
$t_{E\,off}$ =	0,58	µs

Figure 6 IGBT

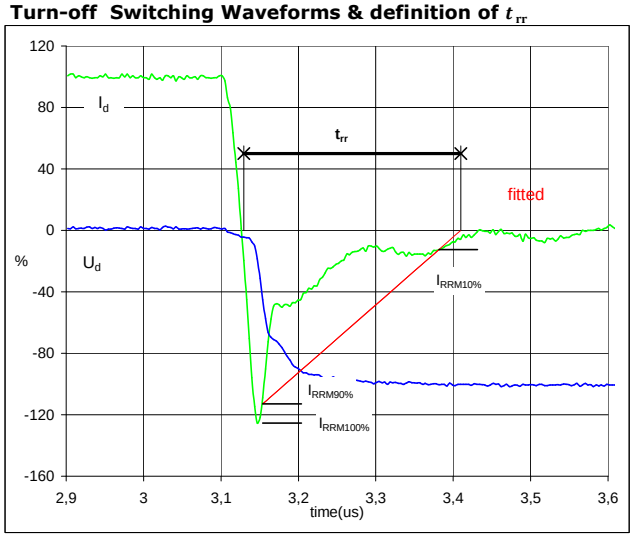
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	15,02	kW
E_{on} (100%) =	1,02	mJ
$t_{E\,on}$ =	0,24	µs

Figure 7 FWD

Turn-off Switching Waveforms & definition of t_{rr}

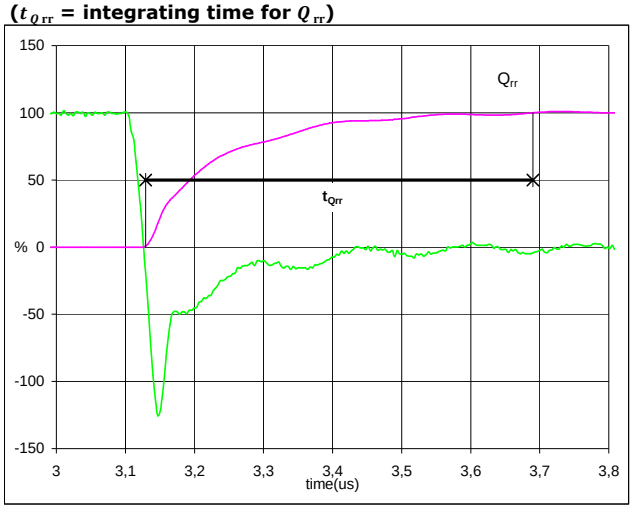


V_d (100%) =	300	V
I_d (100%) =	50	A
I_{RRM} (100%) =	-62	A
t_{rr} =	0,17	µs

Switching Definitions Output Inverter

Figure 8 FWD

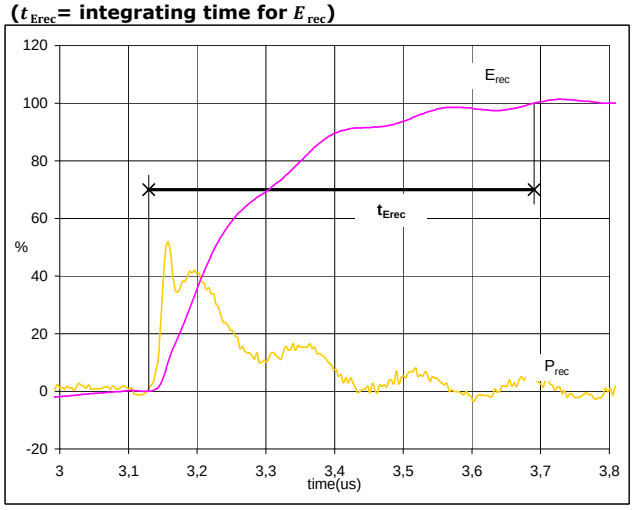
Turn-on Switching Waveforms & definition of t_{Qrr}
($t_{Q\,rr}$ = integrating time for Q_{rr})



I_d (100%) =	50	A
Q_{rr} (100%) =	4,37	µC
$t_{Q\,rr}$ =	0,56	µs

Figure 9 FWD

Turn-on Switching Waveforms & definition of t_{Erec}
(t_{Erec}= integrating time for E_{rec})



P_{rec} (100%) =	15,02	kW
E_{rec} (100%) =	0,92	mJ
$t_{E\,rec}$ =	0,56	µs

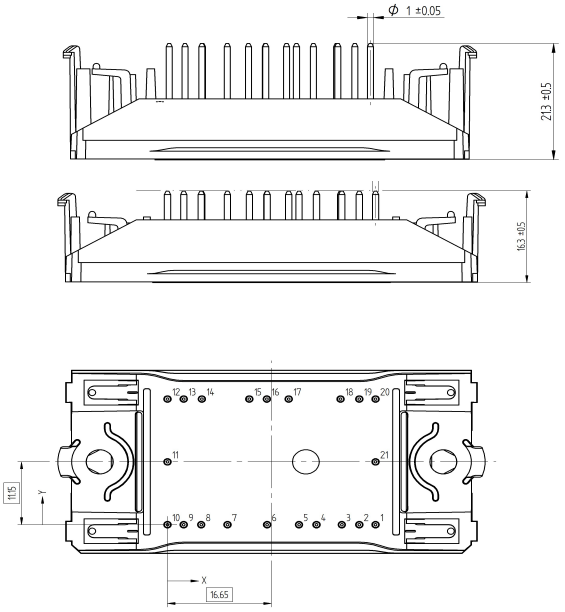
Ordering Code & Marking

Version	Ordering Code
without thermal paste 12 mm housing	V23990-P865-F48-PM
without thermal paste 17 mm housing	V23990-P865-F49-PM

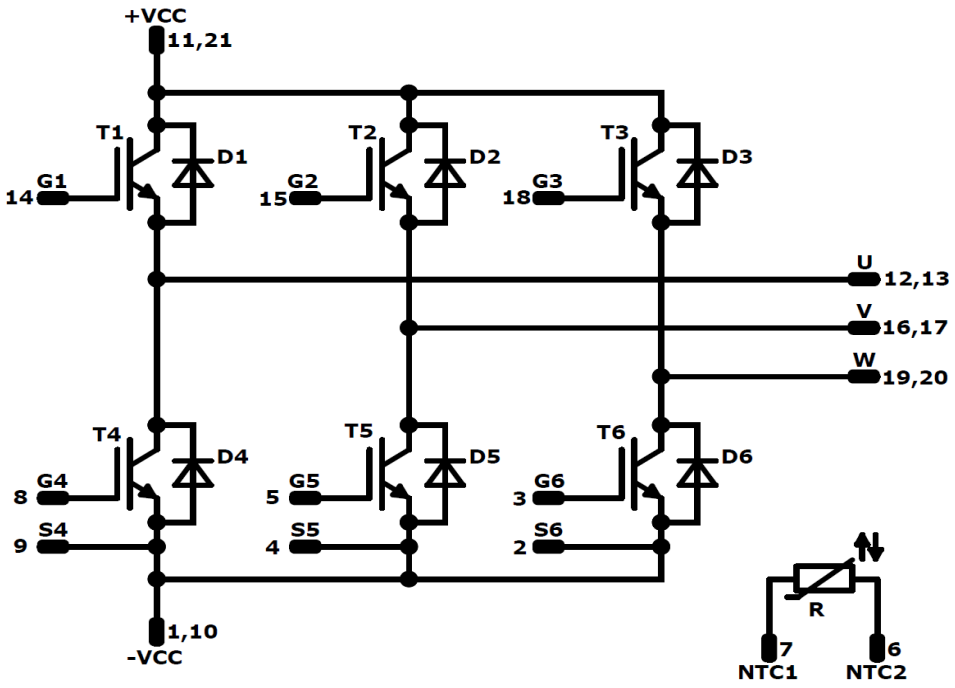
Text	VIN	Date code	Name&Ver	UL	Lot	Serial
	VIN	WWYY	NNNNNNVV	UL	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin table [mm]			
Pin	X	Y	Function
1	33,3	0	-Vcc
2	30,7	0	S6
3	27,9	0	G6
4	23,85	0	S5
5	21,05	0	G5
6	15,95	0	NTC2
7	9,6	0	NTC1
8	5,4	0	G4
9	2,6	0	S4
10	0	0	-Vcc
11	0	11,15	+Vcc
12	0	22,3	U
13	2,6	22,3	U
14	5,5	22,3	G1
15	13,1	22,3	G2
16	15,9	22,3	V
17	19,4	22,3	V
18	27,7	22,3	G3
19	30,7	22,3	W
20	33,3	22,3	W
21	33,3	11,15	+Vcc



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T1, T2, T3, T4, T5, T6	IGBT	600 V	50 A	Inverter Transistor	
D1, D2, D3, D4, D5, D6	FWD	600 V	50 A	Inverter Diode	
R	NTC			Thermistor	

Packaging instruction					
Standard packaging quantity (SPQ)	**135**	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 packages see vincotech.com website.

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
V23990-P865-F4x-D4-14	28 Jan. 2018		

单击下面可查看定价，库存，交付和生命周期等信息

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